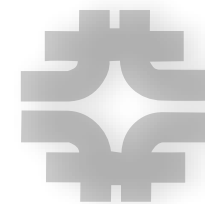




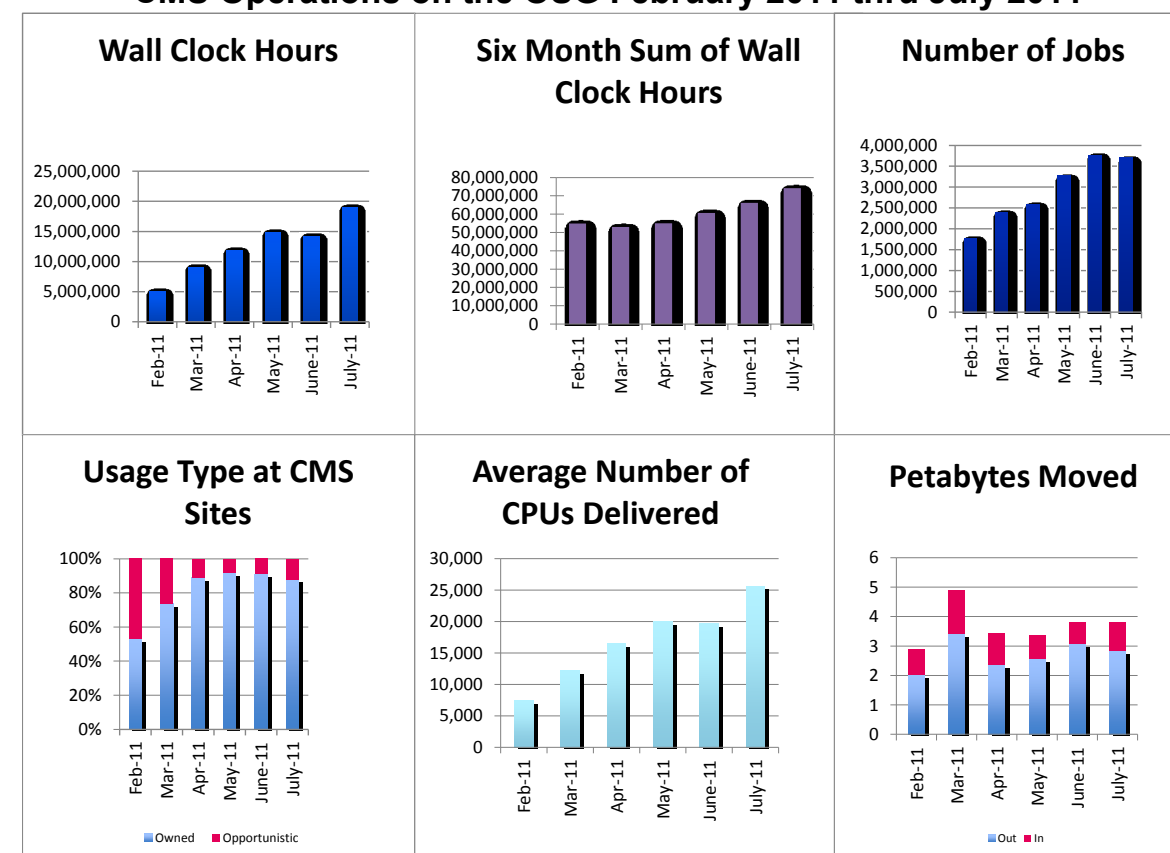
Scientific Collaborations for Extreme-Scale Science



Lothar Bauerdick/Fermilab U.S. CMS Software and Computing Manager

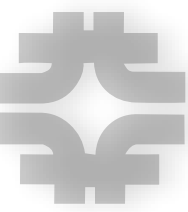
- ★ Recent CMS Computing performance
 - ◆ 20M CPU hours and 4M jobs per month
 - ◆ 25k CPUs across O(50) centers in the U.S.
 - ◆ 4 PetaByte/mo data moved, connecting continents

CMS Operations on the OSG February 2011 thru July 2011





High Energy Physics Challenges and Approaches



- ◆ Huge technical and sociological challenges of world-wide collaborations
 - ★ computing throughput needs: computational, storage, network needs
 - ★ size + complexity: data, software libraries, analysis methods
 - ◆ scientific apparatus w/ $\sim 100\text{M}$ channels, Billions of measurements, simulations
 - ◆ thousands of individual researchers face the issues of complexity, accessibility, discoverability, usability, reproducibility of data and analysis workflows
 - ★ distributed nature of HEP scientific projects
 - ◆ a world-wide distributed collaboration of researchers and computing infrastructure
- ◆ Approach: Distributed High-Throughput Computing
 - ★ distributed computing services and infrastructure operations
 - ★ inclusive consortium of computing centers and scientific organizations
 - ★ sharing of computing resources, services, technologies, techniques
 - ★ also: need for tools for collaborative distributed scientific research
- ◆ Open Science Grid provides a framework for this approach for HEP
 - ★ LHC, other physics, mathematics, bioinformatics, biochemistry, genetics
- ◆ “20th century tools and infrastructure to solve 21st century challenges!”